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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Kenneth LeVey et al.

Serial No.: 09/ 885,796

Filed: June 19, 2001

For: FASTENER HAVING MULTIPLE –
BOSSED LEAD

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Examiner: Shiffman, Jori

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APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 1.191 AND 1.192

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on June 2, 2004 and received by the Patent Office on June 10, 2004.

1. **REAL PARTY IN INTEREST**

The real party in interest is Illinois Tool Works, Inc., the Assignee of the above-referenced application by virtue of the Assignment recorded at reel 01193, frame 0238 and dated June 19, 2001. The undersigned is Appellants' legal representative in this Appeal. Illinois Tool Works, Inc., the Assignee of the above-referenced application, as evidenced by the documents mentioned above, will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

Appellants bring to the Board's attention that an Appeal Brief regarding Application No.: 10/95,404 was filed on July 27, 2004. Application No.: 10/95,404 is a continuation-in-part of the present patent application. Appellants are unaware of any other appeals or inferences related to this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-9, 11-16, 18, 19, 21, 23-28, 30-35, 37-40, 52-58 and 64-65 are currently pending, and claims 1-9, 11-16, 18, 19, 21, 23-28, 30-35, 37-40, 52-58 and 64-65 are currently under final rejection and, thus, are the subject of this appeal.

4. **STATUS OF AMENDMENTS**

All amendments in relation to the claims of the present application have been entered.

5. **SUMMARY OF THE INVENTION
AND OF THE DISCLOSED EMBODIMENTS**

The present invention relates generally to the field of fasteners having at least one lead form with multiple bosses to improve insertion and pullout properties. *See* Application, p.1, ll. 5-8. In accordance with one embodiment, the present invention provides a fastener 10 that includes a head 12, a tip 14 and a threaded shank section 16. *See id.* at p. 4, ll. 23-5. The exemplary fastener 10 includes two leads 18 and 20, which are wound around the perimeter of the shank section 16. *See id.* at p. 5, ll.1-4; FIG.1. Each lead form 18 and 20 includes bosses 24 and bases 22 that are recessed with respect to the bosses 24 and that are disposed between adjacent bosses. *See id.* at p. 5, ll. 9-11; FIG.1. The configuration of these bosses and bases influences the insertion and pullout properties of the fastener, for instance. *See id.* at p. 5, ll. 14-24. For example, the configuration of the bosses and bases can affect the insertion torque required to insert the fastener into material and, similarly, can affect the pullout torque required to remove a fastener. *See id.* Additionally, bases may provide locations in which loose material that

is generated by the insertion or removal of the fastener may settle or flow. *See id.* at p. 5, ll. 19-20.

FIG. 2 of the present application illustrates an exemplary thread profile for leads of a fastener. *See Application*, p. 5, ll. 25-6. In FIG. 2, reference numeral 26 refers to the root of the thread, while reference numeral 28 refers to the thread crest profile itself. *See id.* at p. 5, ll. 26-7. Additionally, each boss in the exemplary thread profile has a lead-in profile 42 and a lead-out profile 44. *See id.* at p. 6, ll. 14-7. In general, the lead-in profile will have a greater effect upon the insertion torque, while the lead-out profile will have a greater effect on the pullout resistance. *See id.* at p. 6, ll. 22-24. *See id.* at p. 5, ll. 19-21. For example, it has been found that a relatively shallow lead-in angle, such as 15 degrees, facilitates insertion of the fastener inserting materials, while excellent pullout resistant has been found with lead-out angles that are relatively steep, on the order of 45 degrees, for instance. *See id.* at p. 8, ll. 6-9. To further customize the characteristics of the fastener, the bosses and bases of each lead may be customized with respect to one another. *See id.* at p. 6, ll. 25-9. For example, the lengths of the bases may be varied with respect to one another, and the lengths of the bases may be varied with respect to one another. *See id.* Additionally, each exemplary thread profile includes a central portion disposed between the lead-in and lead-out profiles, as represented by the length 56 in FIG. 2 of the present application. *See id.* at p. 7, ll. 1-6; FIG.2. As one example, this central section may present a substantially uniform radial dimension, i.e. height. *See id.* at p. 7, ll. 1-6.; FIG. 2 (noting that the height of the bases is indicated by reference numeral 58 and the height of the bosses is indicated by reference numeral 60).

When more than one lead is provided on the fastener, such as is illustrated in Figure 3 of the present application, the features of each lead may be positioned with respect to one another to present a cumulative characteristic for the fastener. *See Application*, p. 7, ll. 9-11. For example, leads may be aligned with respect to one another on the shank so that the bases of one of the leads correspond with bosses of the other

lead. *See id.* at p. 7, ll.11-12; FIG.3. By arranging the leads as such, a relatively uniform insertion torque can be obtained, if desired. *See id.* at p. 7, ll. 19-21.

6. **ISSUES**

Issue No. 1:

Whether the Examiner properly rejected claims 1, 52-55, 63 and 64 under 35 U.S.C. § 102(b) as anticipated by the Yaotani et al. reference (U.S. Patent No. 4,637,767).

Issue No. 2:

Whether the Examiner properly rejected claims 2-7 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Goss et al. reference (U.S. Patent No. 5,961,267).

Issue No. 3:

Whether the Examiner properly rejected claims 8, 56, 57, 58 and 65 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Hiroyuki reference (U.S. Patent No. 5,110,245).

Issue No. 4:

Whether the Examiner properly rejected claims 25, 26, 32, 33, 39 and 40 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Thom reference (U.S. Patent No. 23,409).

Issue No. 5:

Whether the Examiner properly rejected claims 9, 11, 12, 15, 16, 18, 19, 21, 24, 27, 28, 34 and 35 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference, Thom and Goss et al. references.

Issue No. 6:

Whether the Examiner properly rejected claims 23, 30, 33, 37 and 38 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al., Thom reference and the Hiroyuki references.

7. **GROUPING OF CLAIMS**

For the purposes of this Appeal, the claims stand and fall as follows: claims 1-8 and 63 stand and fall together; claims 9 and 11-16 stand and fall together; claims 18, 19, 21, 23 and 24 stand and fall together; claims 25-31 stand and fall together; claims 32-35 and 37-40 stand and fall together; claims 52-58 stand and fall together; claims 64 stands and falls alone; and claim 65 stands and falls alone.

8. **ARGUMENT**

Issue No. 1:

In the Final Office Action, the Examiner rejected claims 1, 52-55, 63 and 64 under 35 U.S.C. § 102(b) as anticipated by the Yaotani et al. reference. Specifically, the Examiner stated as follows:

Regarding claim 1, Figure 8 of Yaotani discloses a threaded fastener with a head 120, a tip 131, and a threaded shank 130 extending between the head and the tip, the shank having a helical lead including a plurality of bosses 150 separated by recessed bases 140, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction toward the tip, a respective lead-out profile in a direction toward the head, and a central section of substantially uniform radial dimension, and the respective profiles comprising a crest profile defining a single apex.

Regarding claims 52-55, Yaotani discloses the claimed threaded fastener as above. The value of the ratios of removal torque to insertion torque is intended use and would be dependent upon the material the screw is used with.

Referring to claims 63 and 64, Yaotani discloses the claimed fastener as above, and further discloses each base

including a central section of substantially uniform radial dimension....

Applicant argues that Yaotani fails to disclose “a central section of substantially uniform radially [sic] dimension” since it is in the form of a circular arc. In response, the Examiner disagrees because the claim does not specify the length for the central section of substantially uniform radially dimension. Yaotani disclose the bosses having a section, any point on the boss, as being a central section of substantially uniform radially dimension.

Final Office Action mailed April 6, 2004, pp. 2-3 and 8-9 (emphasis added). Appellants respectfully traverse the rejections and disagree with the Examiner’s assertions. In view of the following remarks, Appellants respectfully request that the Board withdraw all outstanding rejections in relation to claims 1, 52-55, 63 and 64. In summary, Appellants respectfully assert that the Yaotani et al. reference fails to disclose all of the features recited in the instant claims.

First, Appellants respectfully emphasize that, during patent examination, claims must be given an interpretation that is both reasonable and consistent with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *see also In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); M.P.E.P. §§ 608.01(o) and 2111. Indeed, “[c]laims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them ‘their broadest reasonable interpretation’.” *In re Marosi*, 218 U.S.P.Q. 289, 292 (Fed. Cir. 1983) (emphasis in original). Furthermore, interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. § 2111.

Secondly, Appellants emphasize that anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically

shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). Indeed, “[t]he identical invention must be shown in as complete detail as is contained in the . . . claim.” *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Accordingly, Appellants strongly, yet respectfully emphasize the cited reference must disclose all of the claimed features as are claimed to anticipate the given claim. With the foregoing in mind, Appellants respectfully assert that the instant claims are patentable over and not anticipated by the Yaotani et al. reference.

Independent Claim 1 and the Claims Depending Therefrom

Independent claim 1 recites as follows:

A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex.

(Emphasis added.) Respectfully, Appellants assert that the Yaotani et al. reference fails to disclose all of these recited features.

As quoted and highlighted above, the Examiner contends that the Yaotani et al. reference discloses the “central section of substantially uniform radial dimension” as recited in the instant claim. *See* Final Office Action mailed April 6, 2004, pp. 2-3. Again, the Examiner defined “any point on the boss, as being a central section of

substantially uniform radially [sic] dimension.” *Id.* at pp. 8-9 (emphasis added).

Appellants respectfully disagree with the Examiner’s contentions and assert that the Examiner’s contentions are, at best, an unreasonable interpretation of both the claim and the Yaotani et al. reference.

The Yaotani et al. reference discloses a fastener that includes a series of thread-type projections 150 that radially extend from the shank 130. *See* Yaotani et al., col. 2, ll. 50-8; FIG. 3. As illustrated by FIG. 3 of the Yaotani et al. reference, each of these projections 150 presents a circular profile. *See id.* The circular nature of the projections 150 is further evidenced by the manufacturing technique employed to fabricate the projections. As illustrated by FIG. 6 of the Yaotani et al. reference, the die 210 from which the fastener is formed is manufactured by rotary cutter B that is driven into the die 210. *See id.* at col. 3, ll. 33-9. Because of the circular nature of the cutter B, the formed grooves 240 are arcuate, and, as such, ensure that any protrusion 150 formed by the die is arcuate too. *See id.* at FIG 6; col. 3, ll. 40-9. Thus, the radial profile of the thread projections 150 disclosed in the Yaotani et al. reference is necessarily arcuate (i.e., circular).

As is appreciated by those of ordinary skill in the art of fasteners, a curve has a continuously changing slope. Accordingly, a curved or arcuate surface, by definition, does not have any two points that are uniform in height with respect to one another. In other words, a curved boss, which must present a constantly changing height, cannot have a region that has a “substantially uniform radial dimension” as is recited in the instant claim. Rather, the projections 150 of the Yaotani et al. faster are antithetical to the subject matter of the instant claim, because the constantly changing (i.e., radially arcuate) profile of the protrusions 150. Again, a profile on which no two points, which are infinitely small regions, have the same height cannot, by any means, have a central section with a substantially uniform radial dimension, as recited in the instant claim.

Furthermore, Appellants respectfully assert that the Examiner's interpretation and classification of a point: "any point on the boss, as being a central section of substantially uniform radially [sic] dimension" is both unreasonable and inconsistent with an interpretation developed by one of ordinary skill in the art of fasteners. The term "point," in the mathematical context the Examiner has employed it, is defined as "a dimensionless geometric object having no properties except location." AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 1075 (4th ed. 2000) (emphasis added). Clearly, a dimensionless object cannot reasonably be said to anticipate a "central section with a substantially uniform radial dimension" as recited in the instant claim. Indeed, although parsing geometric entities to an infinite degree may have some mathematical importance and foundation in abstract and theoretical applications, a skilled artisan in the field of fasteners would not find such similar significance. As such, Appellants respectfully assert that a "point" cannot be equated with the central section recited in the instant claim.

Therefore, Appellants respectfully assert that the Yaotani et al. reference does not anticipate independent claim 1 and its respective dependent claim 63. Accordingly, Appellants respectfully request that the Examiner withdraw the Section 102 rejections with respect to claims 1 and 63 that rely on the Yaotani et al. reference.

Independent Claim 52 and the Claims Depending Therefrom

Independent Claim 52 recites as follows:

A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and

presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein a ratio of removal torque to insertion torque is greater than 0.8, and wherein the bosses and bases of the lead comprise a crest profile defining a single continuous apex.

(Emphasis added.) Appellants respectfully assert that the Yaotani et al. reference fails to disclose all of these recited features.

As discussed above, the Yaotani et al. reference does not disclose the central section quoted and highlighted above. Rather, as discussed above, the Yaotani et al. reference discloses a thread profile that is curved and, as such, that is constantly changing in height. Accordingly, the thread profile of the Yaotani et al. reference not only fails to disclose the bosses each having a central section as recited in the instant claim, the fastener of Yaotani et al. is antithetical to the subject matter of the instant claims.

Furthermore, Appellants respectfully assert that the recitation regarding the ratio between insertion and removal torque is not an intended use and, more particularly, is not solely a function of the material in which the fastener is inserted. As appreciated by those of ordinary skill in the art, the material a fastener encounters is static throughout the fasteners path of travel. That is, the material composition does not change between insertion of the fastener and removal of the fastener. Accordingly, the ratio of insertion torque to removal torque (or vice-versa) is not solely “dependent upon the material that the screw is used with.” Indeed, whether the material into which the fastener is inserted is lumber or brick, for example, the ratios between the insertion torque and removal torque would be constant between the two materials. Rather, as discussed in the present application, the lead-in and lead-out profiles and the boss and base profiles of a fastener play a substantial role in determining these ratios. With the foregoing in mind, Appellants respectfully assert that the Examiner has not established that the Yaotani et al. reference discloses the insertion/removal torque relationship recited in the instant claim.

Therefore, Appellants respectfully assert that the Yaotani et al. reference fails to anticipate independent claim 52 and its respective dependent claims 53-55. Based on the foregoing, Appellants respectfully request that that Board withdraw all outstanding Section 102 rejections of claims 52-55 that rely on the Yaotani et al. reference.

Independent Claim 64

Independent claim 64 recites as follows:

A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each recessed base including a central section of substantially uniform radial dimension, and each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex.

(Emphasis added.) Respectfully, Appellants assert that the Yaotani et al. reference fails to disclose all of these features.

As discussed above, the Yaotani et al. reference does not disclose the central section quoted and highlighted above. Rather, as discussed above, the Yaotani et al. reference discloses a thread profile that is curved and, as such, that is constantly changing in height. Accordingly, the thread profile of the Yaotani et al. reference not only fails to disclose the bosses each having a central section as recited in the instant claim, but the fastener of Yaotani et al. is antithetical to the subject matter of the instant claims.

Therefore, Appellants respectfully assert that the Yaotani et al. reference does not anticipate independent claim 64. Based on the foregoing, Appellants respectfully request that that Board withdraw all outstanding Section 102 rejections of claim 64 that rely on the Yaotani et al. reference.

Issue No. 2:

In the Final Office Action, the Examiner rejected dependent claims 2-7 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Goss et al. reference. Specifically, the Examiner stated as follows:

As to the claims, Yaotani discloses the claimed fastener except for the profiles of at least two bosses differing from one another, and at least two bases differing from one another in length, and respective lead-in and lead-out profiles of at least two bosses differ from one another. Goss teaches a fastener wherein the respective profiles of at least bosses 46, 48 and at least two bases differ from one another in length (Figs. 6, 7), as well as the lead-in and lead-out profiles of at least two bosses differing from one another. It would have been obvious at the time the invention was made to a person of ordinary skill in the art to form the profiles of at least two bosses and at least two based differing from one another in length, as well as the lead-in and lead-out profiles of at least two bosses differing from one another in the Yaotani fastener as disclosed in Goss to increase holding strength and resist pullout for a more secure connection.

Final Office Action mailed April 6, 2004, p. 4 (emphasis added). Appellants respectfully traverse the rejection and disagree with the Examiner's assertions. Respectfully Appellants assert that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim. Furthermore, Appellants respectfully assert that the Examiner has failed to provide a convincing line of reasoning as to why the cited references could and should be combined to reach the instant claims. Indeed, the Examiner appears to have employed, at best, impermissible hindsight reconstruction to reach the instant claims.

Appellants respectfully asserts that the burden of establishing a *prima facie* case of obviousness falls on the Examiner. *See Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). To establish a *prima facie* case, the Examiner must not only show that the combination or modification includes all of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the reference or references. *See Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination or modification. *See ACS Hospital Systems, Inc. v. Montefiore Hospital*, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Indeed, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination or modification. *See In re Mills*, 16 U.S.P.Q.2d. 1430 (Fed. Cir. 1990).

Moreover, the Examiner must provide objective evidence, rather than subjective belief and unknown authority, of the requisite motivation or suggestion to combine or modify the cited references. *In re Lee*, 61 U.S.P.Q.2d. 1430 (Fed. Cir. 2002). Indeed, a statement that the proposed modification would have been “well within the ordinary skill of the art” based on individual knowledge of the claimed elements cannot be relied upon to establish a *prima facie* case of obviousness without some *objective reason to combine* the teachings of the references. *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993); *In re Kotzab*, 55 U.S.P.Q.2d. 1313, 1318 (Fed. Cir. 2000); *Al-Site Corp. v. VSI Int'l Inc.*, 50 U.S.P.Q.2d. 1161 (Fed. Cir. 1999).

Furthermore, when prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the

combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). Indeed, the Federal Circuit has warned that the Examiner must not, “fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.” *See In re Dembiczak*, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)). Moreover, avoiding hindsight reconstruction is especially important regarding less technologically complex inventions, where the very ease with which the invention can be understood may prompt one employ such hindsight. *See id.* With the foregoing in mind, Appellants respectfully assert that the instant claims are patentable over the cited references taken alone or in combination.

As discussed above, the Yaotani et al. reference fails to disclose all of the features recited by independent claim 1, the claim from which claims 2-7 depend. Furthermore, neither the Examiner nor the Goss et al. reference itself suggests that the Goss et al. reference is capable of obviating the deficiencies of the Yaotani et al. reference, as discussed above. Indeed, as quoted above, the Examiner explicitly relies solely on the Yaotani et al. reference for the features recited in independent claim 1. Accordingly, Appellants respectfully assert that the Examiner has failed to present a reference combination that discloses all of the features recited in the instant claims.

Even assuming, *arguendo*, the Examiner’s cited reference combination disclosed all of the features recited in the instant claims, the Examiner has failed to present a cogent line of reasoning for combining the cited references and, as such, has failed to present a *prima facie* case of obviousness. As quoted above, the Examiner merely supplied a conclusory statement to support the reference combination: “to increase the holding strength and resist pullout for a more secure connection.” Respectfully, Appellants assert that this statement is not sufficient *objective evidence* to support a *prima facie* case of obviousness. Indeed, the mere desirability of the result of the proposed combination and

modification is not an objectively constructed motivation, suggestion or teaching to combine the cited references in order to reach the instant claims.

Furthermore, claims 2-7 do not necessarily require that the pullout strength be necessarily “increased.” Indeed, in certain embodiments, it may be desirable to provide a fastener having lesser pullout properties. Indeed, one aspect of the claimed subject matter is varying the bosses and bases with respect to one another to vary the characteristics of the fastener, and this variance can be important depending upon the desired application. Accordingly, the Examiner logic to “increase holding strength and resist pullout” does not provide the requisite motivation, suggestion or teaching to combine the cited references to reach the instant claims. Moreover, the Examiner result-based logic evidences that the Examiner has employed impermissible hindsight to reach the instant claims. That is, the Examiner has employed nothing more than the teachings of the present application against itself to combine the cited references.

Further still, the Yaotani et al. reference teaches against combination with the Goss et al. reference to reach the subject matter of the instant claim. As discussed above, the employs a rotating cutter B to fabricate the die used to construct the Yaotani et al. fastener. Specifically, the rotating cutter B cuts an arcuate groove 240 that defines the shape of the projection 150. Thus, to construct a die having a non-arcuate (i.e., linear) groove would require a total departure in the principal of operation and fabrication for the fastener as described in the Yaotani et al. reference. As established by long standing precedent “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. See *Inre Ratti*, 123 U.S.P.Q 344 (C.C.P.A 1959); see also M.P.E.P. § 2143.0, p.2100-127.

Therefore, Appellants respectfully assert that the cited references fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to dependent claims 2-7.

Issue No. 3:

In the Final Office Action, the Examiner rejected claims 8, 56, 57, 58 and 65 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Hiroyuki reference. Specifically, the Examiner stated as follows:

Regarding the claims 8, 56, 57, and 65, Yaotani discloses the claimed fastener except for the lead-in profile differing from the lead-out profile on the same boss. Hiroyuki teaches a fastener with a thread including bosses 4b and bases 6, where lead-in profiles 6b and lead-out profiles 6a differ on the same boss 7. It would have been obvious at the time the invention was made to a person of ordinary skill in the art to form the lead-in profile different from the lead-out profile of the same boss as disclosed in Hiroyuki to increase the holding strength and resist pullout for a more secure connection.

Final Office Action mailed April 6, 2004, p. 4 (emphasis added). Appellants respectfully traverse the rejection and disagree with the Examiner's assertions. Respectfully Appellants assert that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim. Furthermore, Appellants respectfully assert that the Examiner has failed to provide a convincing line of reasoning as to why the cited references could and should be combined to reach the instant claims. Indeed, the Examiner appears to have employed, at best, impermissible hindsight reconstruction to reach the instant claims.

Dependent Claims 8 and 56-58

As discussed above, the Yaotani et al. reference fails to disclose all of the features recited by independent claim 1, the claim from which claim 8 depends, and independent claim 52, the claim from which claims 56-58 depend. Furthermore, neither the Examiner nor the Hiroyuki reference itself suggests that the Hiroyuki reference is capable of obviating the deficiencies of the Yaotani et al. reference, as discussed above. Indeed, as quoted above, the Examiner explicitly relies solely on the Yaotani et al. reference for the

features recited in independent claims 1 and 52. Accordingly, Appellants respectfully assert that the Examiner has failed to present a reference combination that discloses at least these features recited in the independent claims from which the present claims depend.

Even assuming, *arguendo*, the Examiner's cited reference combination disclosed all of the features recited in the instant claims, the Examiner has failed to present a cogent line of reasoning for combining the cited references and, as such, has failed to present a *prima facie* case of obviousness. As quoted above, the Examiner merely supplied a conclusory statement to support the reference combination: "to increase the holding strength and resist pullout for a more secure connection." Respectfully, Appellants assert that this statement, which is identical to the logic provided to combine the Yaotani et al. reference with the Goss et al. reference, is not sufficient objective evidence to support a *prima facie* case of obviousness. Indeed, the mere desirability of the result is not an objectively constructed motivation, suggestion or teaching to combine the cited references in order to reach the instant claims.

Moreover, the Examiner's result-based logic evidences that the Examiner has employed impermissible hindsight to reach the instant claims. That is, the Examiner has employed nothing more than the teachings of the present application itself to establish the motivation to combine the cited references. Furthermore, claims 8 and 56-58 do not necessarily require that the pullout strength be necessarily "increased." Indeed, in certain embodiments, it may be desirable to provide a fastener having lesser pullout properties. Indeed, one aspect of the claimed subject matter is varying the bosses and bases with respect to one another to vary the characteristics of the fastener, and this variance can be important depending upon the desired application. Accordingly, the Examiner's logic to "increase holding strength and resist pullout" does not provide the requisite motivation, suggestion or teaching to combine the cited references to reach the instant claims.

Furthermore, the Hiroyuki reference teaches away from combination with the Yaotani et al. reference to reach the instant claims, because the Hiroyuki reference emphasizes the advantages of interrupting the thread form of a fastener. As quoted above, independent claims 1 and 52 each recites "a crest profile defining a single

continuous apex.” In contrast to this recited subject matter, the Hiroyuki reference teaches that the interrupted threads (i.e., recesses 6) provide improved insertion and removal characteristics. See Hiroyuki, col. 1, l. 64-7 to col. 2, ll. 1-9; col. 3, ll. 60-5. For example, these recesses provide an area into which malleable material may flow and, in turn, resist pullout of the fastener. See *id.* at col. 4, ll. 54-68. Thus, the Hiroyuki reference teaches against the use of a continuous apex as recited in the instant claims. As established by long standing precedent, “[a] *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention.” *In re Geisler*, 43 U.S.P.Q.2d 1362, 1366 (Fed. Cir. 1997) (emphasis added).

Further still, the Yaotani et al. reference teaches against combination with the Hiroyuki reference to reach the subject matter of the instant claim. As discussed above, the fabrication method of Yaotani et al. employs a rotating cutter B to fabricate the die used to construct the Yaotani et al. fastener. Specifically, the rotating cutter B cuts an arcuate groove 240 that defines the shape of the projection 150. Thus, to construct a die having a non-arcuate (i.e., linear) groove would require a total departure in the principal of operation and fabrication for the fastener as described in the Yaotani et al. reference. As established by long standing precedent “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. See *In re Ratti*; see also M.P.E.P. § 2143.01.

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to dependent claims 8 and 56-58.

Independent Claim 65

Independent claim 65 recites as follows:

A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex; and

wherein the lead-in profile of at least one of the bosses is different from the lead-out profile of the same boss.

(Emphasis added.) Respectfully Appellants assert that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim.

Furthermore, Appellants respectfully assert that the Examiner has failed to provide a convincing line of reasoning as to why the cited references could and should be combined to reach the instant claims. Indeed, the Examiner appears to have employed, at best, impermissible hindsight reconstruction to reach the instant claims. Moreover, the Hiroyuki reference teaches away from the instant claim.

As discussed above, the Yaotani et al. reference fails to disclose the “central section” as recited in the instant claim. Rather, the Yaotani et al. reference discloses an undulating crest profile that is constantly changing and, as such, antithetical to the subject matter of the instant claims. Moreover, as quoted above, the Examiner relies solely on the Yaotani et al. reference as disclosure for this “central section” feature. Thus, Appellants respectfully assert that the Examiner has failed to establish that the cited references disclose all of the features recited in the instant claims.

Furthermore, Appellants respectfully assert that the Examiner's perfunctory reasoning for combining the cited references: "to increase holding strength and resist pullout for a more secure connection" does not provide sufficient objective evidence for combining the Yaotani et al. reference with the Hiroyuki reference to reach the instant claims, as discussed above. Rather, and again, the Examiner's result-based reasoning evidences that the Examiner employed nothing more than impermissible hindsight reconstruction to reach the instant claims. Further still, the Hiroyuki reference teaches away from the claimed subject matter, because the Hiroyuki reference touts the advantages of an interrupted thread, which is antithetical to a thread having a continuous apex as recited in the instant claim.

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to independent claim 65.

Issue No. 4:

In the Office Action, the Examiner rejected claims 25, 26, 32, 33, 39 and 40 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference and the Thom reference (U.S. Patent No. 23, 409). Specifically, the Examiner stated as follows:

Regarding claims 25, and 32, Yaotani discloses the claimed fastener as above, except for a second helical lead including a plurality of second bossed and bases. Thom teaches a screw with double lead threads which allow it to be installed with one-half the number of turns. It would have been obvious at the time the invention was made to a person of ordinary skill in the art to add a second, identical thread to Yaotani's screw as disclosed in Thom to allow it to be installed with one-half the number of turns, which would require less torque and force, and would therefore make the screw easier to install. As to claims 25 and 32, since some of the bosses of Yaotani are displaced from one another by 180° at generally corresponding locations on the

shank and the first and second lead would be capable of providing a substantially constant insertion torque.

Final Office Action mailed April 6, 2004, p. 5 (emphasis added). Respectfully Appellants assert that the cited references, taken alone or in combination, fail to disclose all of the features recited in the instant claim. Furthermore, Appellants respectfully assert that the Examiner has failed to provide a convincing line of reasoning as to why the cited references could and should be combined to reach the instant claims.

Independent Claim 25 and the Claims Depending Therefrom

Independent claim 25 recites as follows:

A double-lead threaded fastener comprising:

a tip;

a head;

a shank extending between the tip and the head;

a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases and having a central section of substantially uniform radial dimension; and

a second helical lead identical to the first helical lead, the second helical lead being disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases and having a central section of substantially uniform radial dimension;

wherein the respective first and second bosses are displaced from one another by 180 degrees at generally corresponding locations along the shank, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads comprise a crest profile defining a single continuous apex.

(Emphasis added.)

As discussed above, the Yaotani et al. reference fails to disclose the “central section” as recited in the instant claim. Rather, in a manner antithetical to the subject matter of the instant claim, the Yaotani et al. reference discloses an undulating crest profile, that is constantly changing. Accordingly the Yaotani et al. reference fails to disclose the “central section” as recited in the instant claim. Moreover, as quoted above, the Examiner relies solely on the Yaotani et al. reference as disclosure for this “central section” feature. Indeed, the Thom reference discloses a faster having a pair of leads that fail to include any semblance of bases, let alone bosses that are separated by bases and that include lead-in, lead-out and central portions recited in the instant claim. Thus, Appellants respectfully assert that the Examiner has failed to establish that the cited references disclose all of the features recited in the instant claims.

Further still, and as discussed above, the Yaotani et al. reference teaches against combination with the Thom reference to reach the subject matter of the instant claim. As discussed above, Yaotani et al. employs a rotating cutter B to fabricate the die used to construct the Yaotani et al. fastener. Specifically, the rotating cutter B cuts an arcuate groove 240 that defines the shape of the projection 150. Thus, to construct a die having a non-arcuate (i.e., linear) groove would require a total departure in the principal of operation and fabrication for the fastener as described in the Yaotani et al. reference. As established by long standing precedent “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. “See *In re Ratti*; M.P.E.P. 2143.01.

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to independent claim 25 and its respective dependent claim 26.

Independent Claim 32 and the Claims Depending Therefrom

Independent claim 32 recites as follows:

A double-lead threaded fastener comprising:

a tip;

a head;

a shank extending between the tip and the head;

a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases and less than a 360 degrees around the shank and having a central section of substantially uniform radial dimension; and

a second helical lead identical to the first helical lead, the second helical lead being disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases and less than 360 degrees around the shank and having a central section of substantially uniform radial dimension;

wherein the respective first and second bosses are displaced from one another by 180 degrees at generally corresponding locations along the shank, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads comprise a crest profile defining a single continuous apex.

(Emphasis added.)

As discussed above, the Yaotani et al. reference fails to disclose the “central section” as recited in the instant claim. Rather, in a manner antithetical to the subject matter of the instant claim, the Yaotani et al. reference discloses an undulating crest profile, that is constantly changing. Thus, the Yaotani et al. reference cannot and does not disclose the “central section” recited I the instant claim. Moreover, as quoted above, the Examiner relies solely on the Yaotani et al. reference as disclosure for this “central

section” feature. Indeed, the Thom reference discloses, at best, nothing more than a faster having a pair of leads and fails to disclose any semblance of bases, let alone bosses that are separated by bases and that include lead-in, lead-out and central portions recited in the instant claim. Thus, Appellants respectfully assert that the Examiner has failed to establish that the cited references disclose all of the features recited in the instant claims.

Further still, and as discussed above, the Yaotani et al. reference teaches against combination with the Thom reference to reach the subject matter of the instant claim. As discussed above, Yaotani et al. employs a rotating cutter B to fabricate the die used to construct the Yaotani et al. fastener. Specifically, the rotating cutter B cuts an arcuate groove 240 that defines the shape of the projection 150. Thus, to construct a die having a non-arcuate (i.e., linear) grove would require a total departure in the principal of operation and fabrication for the fastener as described in the Yaotani et al. reference. As established by long standing precedent “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.”

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to independent 32 and its respective dependent claims 33, 39 and 40.

Issue No. 5:

In the Office Action, the Examiner rejected claims 9, 11, 12, 18, 21, 27, 28, 34 and 35 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al. reference, Thom reference and Goss et al. reference. Specifically, the Examiner stated as follows:

Regarding claims 9, 11, 12, 18, 21, 27, 28, 34, and 35,
Yaotani discloses the claimed fastener as above except for

except for [sic] a second helical lead including a plurality of second bosses and bases. Thom teaches a screw with double lead threads which allow it to be installed with one-half the number of turns. It would have been obvious at the time the invention was made to a person of ordinary skill in the art to add a second, identical thread to Yaotani's screw as disclosed in Thom to allow it to be installed with one-half the number of turns, which would require less torque and force, and would therefore make the screw easier to install. Modified Yaotani fails to disclose profiles of at least two bosses of the first lead differing from one another and profiles of at least two bosses of the second lead differing from one another, as well as the lead-in and lead-out profiles of at least two bosses differing from one another. Goss teaches a fastener where the respective profiles of at least two bosses 46, 48 differ from one another (Figs. 6, 7), as well as the lead-in profiles of at least two bosses differing from one another. It would have been obvious at the time the invention was made to a person of ordinary skill in the art to form the profiles of at least two bosses differing from one another, as well as the lead-in and lead-out profiles of at least two bosses differing from one another in the Yaotani fastener as disclosed in Goss to increase holding strength and resist pullout for a more secure connection.

Final Office Action mailed April 6, 2004, pp. 6-7 (emphasis added). Appellants respectfully traverse the rejection and disagree with the Examiner's contentions and interpretations.

Independent Claim 9 and the Claims Depending Therefrom

Independent claim 9 recites as follows:

A threaded fastener comprising:

a head;

a tip;

a threaded shank extending between the head and the tip;

a first helical lead formed on the shank and including a plurality of first bosses therealong, successive first bosses being separated from one another by first bases, each first boss extending radially beyond adjacent first bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head; and

a second helical lead including a plurality of second bosses therealong, successive second bosses being separated from one another by second bases, each second boss extending radially beyond adjacent second bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head;

wherein the profiles of the first and second leads are configured to provide a substantially constant insertion torque, and wherein each of the respective profiles *comprise a crest profile defining a single continuous apex*, and

wherein profiles of at least two bosses of the first lead differ from one another and profiles of at least two bosses of the second lead differ from one another.

(Emphasis added.) Even assuming, *arguendo*, the Examiner's cited reference combination discloses all of the features recited in the instant claim, Appellants respectfully assert that the cited references lack the requisite motivation necessary to reach the instant claim.

As quoted above, the Examiner finds the motivation to combine the cited references via two lines of logic: 1) "to allow it [the modified fastener] to be installed with one-half the number of turns, which would require less torque and force, and would therefore make the screw easier to install;" and 2) "to increase holding strength and resist pullout for a more secure connection." *See* Final Office Action mailed April 6, 2004, pp. 6-7. Respectfully, Appellants assert that the Examiner has, at best, presented nothing more than an affirmation of the desirability of the results of Appellants' claimed subject matter, and, as such, the Examiner has failed to present a *prima facie* case of obviousness.

As discussed above, the Examiner bears the burden of establishing a *prima facie* case of obviousness. See M.P.E.P § 2142, p. 2100-123 (stating “[t]he examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness”) (emphasis added). Moreover, the Examiner must not simply establish that the cited reference disclose all of the features recited in a claim, but rather the Examiner must establish claimed invention, as a whole, would have been obvious in view of the cited references. See *Stratoflex, Inc. v. Aeroquip Corp.*, 218 U.S.P.Q. 871 (Fed. Cir. 1983).

In the instant rejection, the Examiner has failed to present a line of reasoning that establishes any commonality or unifying thread between the three cited references. Rather, the Examiner has employed a first conclusory line of reasoning to combine the Yaotani et al. reference and the Thom reference and a second conclusory line of reasoning that is wholly independent of the first line of reasoning to include the Goss et al. reference in the combination. In other words, the Examiner has failed to present any reasoning that transcends the references. This failure to couple the references evidences that the Examiner has failed to consider the claimed subject matter as a whole in accordance with long stand precedent and the M.P.E.P.

Furthermore, Appellants respectfully assert that the Examiner has, as best, employed impermissible hindsight reconstruction to reject the subject matter of the instant claims. As discussed above, the Examiner, as the reasoning for combining the references, states nothing more than the results of the combination are desirable: “to allow it [the modified fastener] to be installed with one-half the number of turns, which would require less torque and force, and would therefore make the screw easier to install;” and 2) “to increase holding strength and resist pullout for a more secure connection.” See Final Office Action mailed April 6, 2004, pp. 6-7 (emphasis added). Indeed, these above-quoted statements do not provide a motivation as to why a skilled artisan would combine the references, but rather affirm that combining the references would produce certain desirable results.

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to independent claim 9 and its respective dependent claims 11, 12, 15 and 16.

Independent Claim 18 and the Claims Depending Therefrom

Independent claim 18 recites as follows:

A double-lead threaded fastener comprising:

- a tip;
- a head;
- a shank extending between the tip and the head;
- a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases; and
- a second helical lead disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases;

wherein the first bosses and the second bases are disposed along the shank at generally corresponding locations, and the second bosses and the first bases are disposed along the shank at generally corresponding locations, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads comprise a crest profile defining a single continuous apex, and wherein lead-in profiles of at least two of the bosses of the first and the second leads are different from one another.

Even assuming, *arguendo*, the Examiner's cited reference combination discloses all of the features recited in the instant claim, Appellants respectfully assert that the cited reference lack the requisite motivation necessary to reach the instant claim.

As discussed above, the Examiner bears the burden of establishing a *prima facie* case of obviousness. Again, the Examiner must establish this case by presenting a cogent line of reasoning as to why the combination renders the claimed subject matter, as a whole, obvious in view of the cited references. In the instant case, as discussed above, the Examiner has failed to present this line of reasoning with respect to the subject matter as a whole. Rather, the Examiner has chosen bits and part of various references without linking the references to the claimed subject matter as a whole. Furthermore, as also discussed above, the Examiner has presented nothing more than an affirmation of the desirability of the result as the motivation for combination. Indeed, such conclusory and result-oriented statements cannot provide the objective evidence and motivation for combining the cited references to reach the instant claims. Rather, these result-oriented statements establish that the Examiner has, at best, employed impermissible hindsight to reach the instant claims.

Therefore, Appellants respectfully assert that the cited references, taken alone or in combination, fail to render obvious the instant claims and that the Examiner has failed to present a *prima facie* case of obviousness. Thus, Appellants respectfully request that that Board withdraw the Section 103 rejections in relation to independent claim 18 and its respective dependent claim 21.

Dependent Claim 27, 28, 34 and 35

Appellants respectfully assert that dependent claims 27 and 28, which depend from independent claim 25, and dependent claims 34 and 35, which depend from independent claim 32, are patentable over the cited references not only by virtue of their respective dependencies on an allowable base claim, but also by virtue of the additional features recited therein. Indeed, neither the Examiner nor the additional Goss et al. reference itself, suggests that the Goss reference is capable of obviating the deficiencies of the Yaotani et al. and Thom references, as discussed above.

Therefore, Appellants respectfully request that the Board withdraw the Section 103 rejection in relation to dependent claims 27, 28, 34 and 35.

Issue No. 6:

In the Final Office Action the Examiner rejected dependent claims 23, 30, 31, 37 and 38 under 35 U.S.C. § 103(a) as obvious in view of the Yaotani et al., Thom, and Hiroyuki references. Appellants respectfully traverse the rejection and disagree with the Examiner's assertions and contentions.

Appellants respectfully assert that dependent claim 23, which depends from independent claim 18, dependent claims 30 and 31, which depend from independent claim 25, and independent claims 37 and 38, which depend from independent claim 32, are patentable over the cited references not only by virtue of their respective dependencies on an allowable base claim, but also by virtue of the additional features recited therein. Indeed, neither the Examiner nor the additional Hiroyuki reference itself, suggests that the Hiroyuki reference is capable of obviating the deficiencies of the Yaotani et al. and Thom references, as discussed above.

Therefore, Appellants respectfully request that the Board withdraw all outstanding Section 103 rejections in relation to dependent claims 23, 30, 31, 37 and 38.

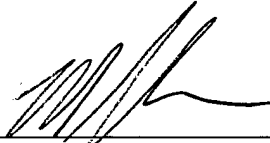
CONCLUSION

The Commissioner is authorized to charge the requisite fee of \$330.00, and any additional fees which may be required, to the credit card listed on the attached PTO-2038. However, if the PTO-2038 is missing, if the amount listed thereon is insufficient, or if the amount is unable to be charged to the credit card for any other reason, the Commissioner is authorized to charge Deposit Account No. 06-1315; Order No. ITWO: 0004/YOD (12984).

General Authorization for Extensions of Time

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefore. Furthermore, Applicants authorize the Commissioner to charge the appropriate fee for any extension of time to Deposit Account No. 06-1315, Order No. ITWO:0004/YOD (12984).

Respectfully submitted,



Date: August 10, 2004

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9. Index of the Claims

1. A threaded fastener comprising:
a head;
a tip; and
a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex.
2. The fastener of claim 1, wherein the respective profiles of at least two bosses differ from one another.
3. The fastener of claim 2, wherein the respective lead-in profiles of the at least two bosses differ from one another.
4. The fastener of claim 2, wherein the respective lead-out profiles of the at least two bosses differ from one another.
5. The fastener of claim 2, wherein the respective profiles differ from one another in length.
6. The fastener of claim 1, wherein at least two bases differ from one another.
7. The fastener of claim 6, wherein the at least two bases differ from one another in length.

8. The fastener of claim 1, wherein for at least one of the bosses the lead-in profile differs from the lead-out profile.

9. A threaded fastener comprising:
a head;
a tip;
a threaded shank extending between the head and the tip;
a first helical lead formed on the shank and including a plurality of first bosses therealong, successive first bosses being separated from one another by first bases, each first boss extending radially beyond adjacent first bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head; and

a second helical lead including a plurality of second bosses therealong, successive second bosses being separated from one another by second bases, each second boss extending radially beyond adjacent second bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head;

wherein the profiles of the first and second leads are configured to provide a substantially constant insertion torque, and wherein each of the respective profiles comprise a crest profile defining a single continuous apex, and

wherein profiles of at least two bosses of the first lead differ from one another and profiles of at least two bosses of the second lead differ from one another.

10. (canceled).

11. The fastener of claim ~~40~~ 9, wherein the respective lead-in profiles of the at least two bosses of the first and second lead differ from one another.

12. The fastener of claim ~~40~~ 9, wherein the respective lead-out profiles of the at least two bosses of the first and second lead differ from one another.

13. The fastener of claim 9, wherein lead-in profiles of the first lead and lead-out profiles of the second lead are disposed at corresponding locations along the shank between the tip and the head.

14. The fastener of claim 13, wherein lead-out profiles of the first lead and lead-in profiles of the second lead are disposed at corresponding locations along the shank between the tip and the head.

15. The fastener of claim 9, wherein the first bosses and the second bases are disposed at corresponding locations along the shank between the tip and the head.

16. The fastener of claim 15, wherein the second bosses and the first bases are disposed at corresponding locations along the shank between the tip and the head.

17. (canceled).

18. A double-lead threaded fastener comprising:
a tip;
a head;
a shank extending between the tip and the head;
a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases; and
a second helical lead disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases;
wherein the first bosses and the second bases are disposed along the shank at generally corresponding locations, and the second bosses and the first bases are disposed along the shank at generally corresponding locations, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads

comprise a crest profile defining a single continuous apex, and wherein lead-in profiles of at least two of the bosses of the first and the second leads are different from one another.

19. The fastener of claim 18, wherein each of the first and second bosses includes a respective lead-in profile and lead-out profile, and wherein the lead-in profiles of the first bosses and the lead-out profiles of the second bosses are disposed at generally corresponding locations along the shank, and the lead-out profiles of the first bosses and the lead-in profiles of the second bosses are disposed at generally corresponding locations along the shank.

20. (canceled).

21. The fastener of claim 19, wherein lead-out profiles of at least two of the bosses of the first and second leads are different from one another.

22. (canceled).

23. The fastener of claim 19, wherein the lead-in profiles of the bosses of the first and second leads are inclined less than the lead-out profiles for the same bosses.

24. The fastener of claim 18, wherein the first lead is identical to the second lead.

25. A double-lead threaded fastener comprising:

a tip;

a head;

a shank extending between the tip and the head;

a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases and having a central section of substantially uniform radial dimension; and

a second helical lead identical to the first helical lead, the second helical lead being disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases and having a central section of substantially uniform radial dimension;

wherein the respective first and second bosses are displaced from one another by 180 degrees at generally corresponding locations along the shank, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads comprise a crest profile defining a single continuous apex.

26. The fastener of claim 25, wherein each of the first and second bosses includes a respective lead-in profile and lead-out profile, and wherein the lead-in profiles of the first bosses and the lead-out profiles of the second bosses are disposed at generally corresponding locations along the shank, and the lead-out profiles of the first bosses and the lead-in profiles of the second bosses are disposed at generally corresponding locations along the shank.

27. The fastener of claim 26, wherein the lead-in profiles of at least two of the bosses of the first and the second leads are different from one another.

28. The fastener of claim 26, wherein lead-out profiles of at least two of the bosses of the first and second leads are different from one another.

29. (canceled).

30. The fastener of claim 26, wherein the lead-in profiles of the bosses of the first and second leads are inclined less than the lead-out profiles for the same bosses.

31. The fastener of claim 25, wherein profiles of bosses of the first and the second leads vary along the shank from the tip to the head.

32. A double-lead threaded fastener comprising:
a tip;
a head;
a shank extending between the tip and the head;
a first helical lead disposed about the shank and including first bosses separated by first bases, the first bosses extending radially beyond the first bases and less than a 360 degrees around the shank and having a central section of substantially uniform radial dimension; and
a second helical lead identical to the first helical lead, the second helical lead being disposed about the shank and including second bosses separated by second bases, the second bases extending radially beyond the second bases and less than 360 degrees around the shank and having a central section of substantially uniform radial dimension;
wherein the respective first and second bosses are displaced from one another by 180 degrees at generally corresponding locations along the shank, and wherein the first and second bosses and the first and second bases are disposed along the shank to provide a substantially constant insertion torque, and wherein the bosses and bases of each of the respective leads comprise a crest profile defining a single continuous apex.

33. The fastener of claim 32, wherein each of the first and second bosses includes a respective lead-in profile and lead-out profile, and wherein the lead-in profiles of the first bosses and the lead-out profiles of the second bosses are disposed at generally corresponding locations along the shank, and the lead-out profiles of the first bosses and the

lead-in profiles of the second bosses are disposed at generally corresponding locations along the shank.

34. The fastener of claim 33, wherein the lead-in profiles of at least two of the bosses of the first and the second leads are different from one another.

35. The fastener of claim 33, wherein lead-out profiles of at least two of the bosses of the first and second leads are different from one another.

36. (canceled).

37. The fastener of claim 33, wherein the lead-in profiles of the bosses of the first and second leads are inclined less than the lead-out profiles for the same bosses.

38. The fastener of claim 32, wherein profiles of bosses of the first and the second leads vary along the shank from the tip to the head.

39. The fastener of claim 32, wherein each of the first and second bosses extends less than 180 degrees around the shank.

40. The fastener of claim 39, wherein each of the first and second bosses extends less than 90 degrees around the shank.

41. – 51. (canceled).

52. A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein a ratio of removal torque to insertion torque is greater than 0.8, and wherein the bosses and bases of the lead comprise a crest profile defining a single continuous apex.

53. The threaded fastener of claim 52, wherein the ratio is greater than 0.9.

54. The threaded fastener of claim 53, wherein the ratio is greater than 1.0

55. The threaded fastener of claim 54, wherein the ratio is greater than 1.1.

56. The threaded fastener of claim 52, wherein the fastener comprises first and second leads about a shank, each lead having a series of bosses, lead-in profiles and lead-out profiles of the bosses differing from one another to provide the ratio.

57. The threaded fastener of claim 56, wherein the first and second leads are identical to one another.

58. The threaded fastener of claim 56, wherein crests of the lead-in profiles are inclined at approximately 15 degrees from the thread root, and crests of the lead-out profiles are inclined at approximately 45 degrees from the thread root.

59. - 62. (canceled).

63. The fastener of claim 1, wherein each recessed base includes a central section of substantially uniform radial dimension.

64. A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each recessed base including a central section of substantially uniform radial dimension, and each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex.

65. A threaded fastener comprising:

a head;

a tip; and

a threaded shank extending between the head and the tip, the threaded shank having a helical lead formed thereon, the lead including a plurality of bosses therealong, successive bosses being separated from one another by recessed bases, each boss extending radially beyond adjacent bases and presenting a respective profile including a lead-in profile in a direction towards the tip, a respective lead-out profile in a direction towards the head and a central section of substantially uniform radial dimension, wherein the respective profiles comprise a crest profile defining a single continuous apex; and

wherein the lead-in profile of at least one of the bosses is different from the lead-out profile of the same boss.